

# Marine Mammals of the Pacific Region including Hawaii

## INTRODUCTION

The Pacific region has 66 stocks of at least 37 species of marine mammals. The U.S. Fish and Wildlife Service is responsible for managing two stocks of sea otters (Central California and Washington), while NOAA Fisheries has management authority for the remaining cetacean and pinniped stocks. According to the criteria provided in the 1994 amendments to the Marine Mammal Protection Act, these include 16 strategic stocks. In the eastern Pacific (i.e., waters of Washington, Oregon, California and Northern Mexico) the strategic stocks include: endangered sperm, humpback, blue, fin, and sei

whales; short-finned pilot whales, Baird's beaked whales, Mesoplodont beaked whales, Cuvier's beaked whale, pygmy sperm whales, and threatened Guadalupe fur seals. Strategic stocks in Hawaiian waters include endangered blue, fin, and sperm whales, and Hawaiian monk seals. Of all the Pacific region stocks, 13 are believed to be increasing, 13 are believed to be stable, 4 are declining, and the trends of 36 stocks are unknown.

The status of marine mammal stocks in the Pacific region is summarized in Table 23-1. Important population parameters of the stocks and their status under the various protected species laws are included. A narrative for some selected stocks follows:

## HAWAIIAN MONK SEAL

### Stock Definition and Geographic Range

Hawaiian monk seals are distributed throughout the northwestern Hawaiian Islands (NWHI) in six main reproductive populations at French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll, and Kure Atoll. The Midway population has not contributed significantly to pup production since the 1950s. Additional populations, with limited reproduction and maintained by immigration, are found at Necker Island and Nihoa Island, and a small number of seals are distributed throughout the main Hawaiian Islands.

In the last two centuries, this species has experienced two major declines which, presumably, have severely reduced its genetic variation. The tendency for genetic drift may have been (and continue to be) relatively large, due to the small size of the different island and atoll populations. However, 10-15% of the seals migrate among the different populations and, at least to some degree, this movement should counter the development of separate genetic stocks.

Demographically, the different island populations have exhibited considerable independence. For example, abundance at French Frigate Shoals grew rapidly during the 1950s to the 1980s, while other populations declined

**Table 23-1.** Status of Marine Mammal Stocks in the Pacific Region, including Hawaii

Species	Stock Area	N <sub>MIN</sub> <sup>1</sup>	PBR <sup>2</sup>	Total Annual Mortality	Strategic Status <sup>3</sup>	MMPA/ESA Status <sup>4</sup>	Trend <sup>5</sup>
Sperm whale	CA/OR/WA	511	1.0	15	Y	E	S
Humpback whale	CA/Mexico	563	0.5	1	Y	E	I
Blue whale	CA/Mexico	1,708	1.7	1	Y	E	I
Fin whale	CA/WA	575	1.1	1	Y	E	I
Brydes whale	E. Tropical Pacific	11,145	0.5	N/A			U
Sei whale	E. North Pacific	N/A	N/A	N/A	Y	E	U
Mink whale	CA/WA	265	2.6	0.5			U
Harbor porpoise	Central CA	3,430	34	31			D
Harbor porpoise	N. California	7,649	76	0			S
Harbor porpoise	OR/WA	22,049	220	14.2			U
Harbor porpoise	Inland WA	2,680	27	15			D
Dall's porpoise	CA/WA	58,902	589	36			U
Pacific white-sided dolphin	CA/WA	82,939	829	28			S
Risso's dolphin	CA/WA	22,388	224	39			U
Bottlenose dolphin	CA coastal	245	2.5	0			S
Bottlenose dolphin	CA/WA offshore	1,775	18	8			U
Striped dolphin	California	13,639	136	0			U
Common dolphin (short-beaked)	CA/WA	179,185	1,792	316			I
Common dolphin (long-beaked)	California	5,636	56	23			U
Northern right whale dolphin	CA/WA	15,080	151.0	46			U
Killer whale	CA/WA	139	1.4	0			U
Pilot whale (short-finned)	CA/WA	N/A	N/A	36	Y	M>PBR	U
Baird's beaked whale	CA/WA	19	0.2	2	Y	M>PBR	U
Mesoplodont beaked whale	CA/WA	136	1.4	8	Y	M>PBR	U
Cuvier's beaked whale	CA/WA	886	9.0	24	Y	M>PBR	U
Pygmy sperm whale	CA/WA	481	4.8	6	Y	M>PBR	U
Dwarf sperm whale	CA/WA	N/A	N/A	0			U
Brydes whale	Hawaii	N/A	N/A	0			U
Blue whale	Hawaii	N/A	N/A	0	Y	E	U
Fin whale	Hawaii	N/A	N/A	0	Y	E	U

...to be continued in next table...

<sup>1</sup> N<sub>MIN</sub> = Minimum population is estimated as the lower 20th percentile of the log-normal distribution of the population estimate, which is equivalent to the lower limit of a 60% two-tailed confidence interval.

<sup>2</sup> PBR = Potential biological removal.

<sup>3</sup> Strategic status: Y = yes, N/A = information is not available and N/D = estimated value has not been determined at this time.

<sup>4</sup> MMPA/ESA status: E = listed as endangered and T = listed as threatened under the Endangered Species Act.

<sup>5</sup> D = listed as depleted under the Marine Mammal Protection Act.

<sup>6</sup> Trend is increasing (I), stable (S), decreasing (D), and unknown (U).

rapidly. Current demographic variability among the island populations probably reflects a combination of different histories and varying environmental conditions. While management activities and research focus on single island and atoll populations, this species is managed as, and considered to be, a single stock.

### Population Size

Total abundance of the Hawaiian monk seal was estimated to be 1,580 (SE=147) in 1992. Mean counts of animals found on beaches are used as the primary index of abundance. Between 1992 and 1993, the total mean count at the main reproductive population centers (excluding Midway) declined by 11%. If the decline in mean counts represent a similar decline in the total number of seals, then the best estimate of abundance for 1993 would be 1,406 (SE=131; assuming constant CV).

### Minimum Population Size

Using 1,406 as the most current estimate of abundance,  $131/1,406 = 0.093$  as the coefficient of variation, the best estimate of  $N_{\text{MIN}}$  is calculated as 1,300 seals.

### Current Population Trend

Between 1958 and 1993, mean beach counts at the main reproductive populations declined by 60% (Fig. 23-1). From 1985 to 1993, the counts declined by 5% per year.

Human-induced mortality has caused two major declines of the Hawaiian monk seal, and may continue to be an important factor impeding its recovery. In the 1800s, this species was decimated by sealers, surviving sailors of wrecked ships, and guano and feather hunters. A 1958 survey indicated at least partial recovery of the species in the first half of this century; however, subsequent surveys documented a second major decline beginning in 1958 (or earlier), during which several populations (Kure Atoll, Midway Atoll, and Pearl and Hermes Reef) decreased by 80-100%. Population trends at Kure Atoll, Midway Atoll, and French Frigate Shoals appear to have been determined by the pattern of human disturbance which, among other effects, caused pregnant females to abandon prime pupping habitat and nursing females to abandon their pups.

Since 1979, disturbance from human activities on land has declined, but disturbance at sea from fishing activities, may impede recovery. Development and expansion of fisheries during the 1970s in the NWHI has lead to interactions detrimental to monk seals. The interactions fall into four categories: operations and gear conflict, entanglement in fisheries debris, seal consumption of potentially toxic discard, and competition for prey. The Hawaiian monk seal interacts with four fisheries: the NWHI lobster fishery, the NWHI bottomfish fishery, the pelagic longline fishery, and recreational fisheries in the main Hawaiian Islands and at Kure Atoll.

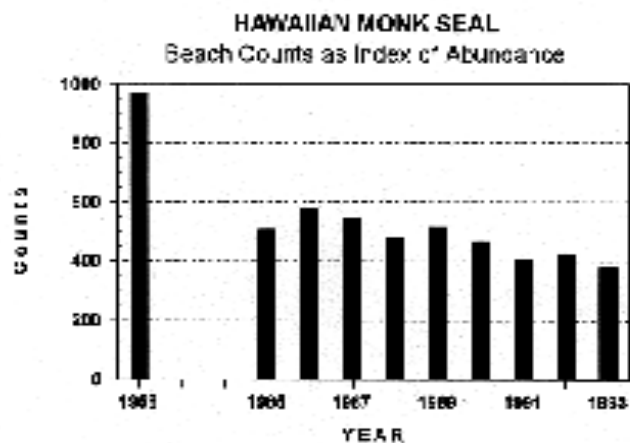


Fig 23-1 -- Hawaiian monk seal mean beach counts as a primary index of population abundance.

### Status of Stock

In 1976, the Hawaiian monk seal was designated depleted under the MMPA and as endangered under the ESA. Under the methodology specified in the 1994 amendments to the MMPA and employing the values of  $N_{\text{MIN}}$  and  $R_{\text{MAX}}$  (1,300 and 0.06/yr, respectively), the calculated PBR is 3.9 seals. However, the ESA takes precedence in the management of this species and, under the ESA, the allowable take of monk seals is zero.

The species is assumed to be well below its OSP and, since 1985, has been declining at 5% per year. Therefore, this species is characterized as a strategic stock.

## HARBOR PORPOISE: CENTRAL CALIFORNIA STOCK

### Stock Definition and Geographic Range

In the Pacific, harbor porpoise are found in coastal and inland waters from Point Conception, California to Alaska and across to Kamchatka and Japan. Harbor porpoise appear to have more restricted movements along the west coast of the continental U.S. than along the east coast. Regional differences in pollutant residues taken from harbor porpoise indicate that they do not mix freely between California, Oregon, and Washington. The study also showed some regional differences within California (although the sample size was small). This pattern stands as a sharp contrast to the east coast of the U.S. and Canada where harbor porpoise are believed to migrate seasonally from as far south as the Carolinas to the Gulf of Maine and Bay of Fundy. Early genetic analyses did not show any significant differences between samples from California and Washington, but more recent analyses with larger sample sizes do show significant differences. These studies show that porpoises on the west coast are not panmictic or migratory, and movement is sufficiently restricted that genetic differences have evolved.

treated as a separate stock. The justifications given for this were: 1) fishery mortality of harbor porpoise is limited to central California, 2) movement of individual animals appeared to be restricted within California, and consequently 3) fishery mortality could cause the local depletion of harbor porpoise if central California is not managed separately. Because the recent genetic studies have confirmed that movement on the west coast is limited, harbor porpoise in central California is considered to be a separate stock. Other Pacific coast stocks of harbor porpoise include: 1) a northern California stock, 2) an Oregon/Washington coastal stock, 3) a Washington inland-waters stock, and 4) an Alaska stock.

### Population Size

A 1994 review of previous estimates of harbor porpoise abundance in central California resulted in a new estimate of 4,120 (CV=0.22) based on a series of aerial surveys from 1988 to 1993. This recent estimate is not significantly different from the previous estimate of 3,274 (CV=0.31) but is more precise (owing to the greater number of kilometers surveyed). Both of these estimates only include the region between the coast and the 50-fathom (91m) isobath. In California, the vast majority of harbor porpoise are sighted within this depth range; however, 24% of harbor porpoise seen during aerial surveys of Oregon and Washington were between the 100m and 200m isobaths (55 to 109 fathoms). Thus, these abundance estimates are likely underestimates of the total abundance by a significant amount.

### Minimum Population Estimate

The current minimum population estimate of 3,431 animals in central California is based on aerial surveys flown between 1988 and 1993.

### Current Population Trend

Current estimates of population abundance trend are based on an analysis of a 1986-93 time series of abundance estimates from aerial surveys. The analysis found a statistically significant decline in harbor porpoise abundance in central California ( $p < 0.1$ ) (Fig. 23-2). The decline is most evident in the southern part of central California, between Point Conception and Monterey Bay. There was no indication of

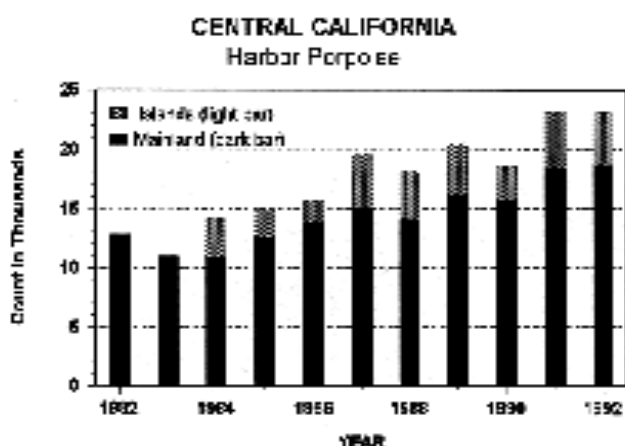


Fig. 23-2. California harbor porpoise counts

In its harbor porpoise assessment, NOAA Fisheries recommended that the animals inhabiting central California (defined to be from Point Conception to the Russian River) be

**Table 23-1.**  
(Contd.) **Status of Marine Mammal Stocks  
in the Pacific Region, including Hawaii**

Species	Stock Area	N <sub>MIN</sub> <sup>1</sup>	PBR <sup>2</sup>	Total Annual Mortality	Strategic Status <sup>3</sup>	MMPA/ESA Status <sup>4</sup>	Trend <sup>5</sup>
...continued from previous table...							
Pygmy killer whale	Hawaii	N/A	N/A	N/A			U
Pilot whale (short-finned)	Hawaii	N/A	N/A	N/A			U
Risso's dolphin	Hawaii	N/A	N/A	N/A			U
Killer whale	Hawaii	N/A	N/A	0.0			U
Melon-headed whale	Hawaii	N/A	N/A	0.0			U
False killer whale	Hawaii	N/A	N/A	N/A			U
Pantropical spotted dolphin	Hawaii	N/A	N/A	N/A			U
Striped dolphin	Hawaii	N/A	N/A	N/A			U
Spinner dolphin	Hawaii	677	6.8	1.0			U
Rough-toothed dolphin	Hawaii	N/A	N/A	N/A			U
Bottlenose dolphin	Hawaii	N/A	N/A	0.0			U
Pygmy sperm whale	Hawaii	N/A	N/A	N/A			U
Dwarf sperm whale	Hawaii	N/A	N/A	0.0			U
Sperm whale	Hawaii	N/A	N/A	N/A	Y	E	U
Cuvier's beaked whale	Hawaii	N/A	N/A	0.0			U
Blainville's beaked whale	Hawaii	N/A	N/A	0.0			U
California sea lion	U.S.	84,195	5,052	2,434			I
Harbor seal	California	32,800	1,968	729			I
Harbor seal	WA inland waters	13,053	783	14			I
Harbor seal	OR/WA	28,322	850	233			I
Northern elephant seal	CA breeding	42,000	1,743	166			I
Northern fur seal	San Miguel Island	10,536	227	0			I
Guadalupe fur seal	Mexico to CA	3,028	104	0	Y	T	I
Hawaiian monk seal	Hawaii	1,300	4.6	1	Y	E	D
Northeastern spotted dolphin	E. Tropical Pacific	648,900	6,489	934		D	D
W/S offshore spotted dolphin	E. Tropical Pacific	1,145,100	11,451	1,226			S
Eastern spinner dolphin	E. Tropical Pacific	518,500	5,185	743		D	S
Whitebelly spinner dolphin	E. Tropical Pacific	872,000	8,720	619			S
Common dolphin (northern)	E. Tropical Pacific	3,531,000	3,531	101			S
Common dolphin (central)	E. Tropical Pacific	297,400	2,974	151			S
Common dolphin (southern)	E. Tropical Pacific	1,845,600	18,456	0			S
Striped dolphin	E. Tropical Pacific	1,745,900	17,459	11			S
Coastal spotted dolphin	E. Tropical Pacific	22,500	225	N/A			S
Central American spinner dolphin	E. Tropical Pacific	N/A	N/A	11			S
Sea otter	Central CA				Y		I
Sea otter	WA						I

<sup>1</sup> N<sub>MIN</sub> = Minimum population is estimated as the lower 20th percentile of the log-normal distribution of the population estimate, which is equivalent to the lower limit of a 60% two-tailed confidence interval.  
<sup>2</sup> PBR = Potential biological removal.  
<sup>3</sup> Strategic status: Y = yes, N/A = information is not available and N/D = estimated value has not been determined at this time.  
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D = listed as depleted under the Marine Mammal Protection Act.  
<sup>5</sup> Trend is increasing (I), stable (S), decreasing (D), and unknown (U).

any compensating increase in porpoise abundance in northern California. The decline is somewhat surprising given that fishery mortality has been reduced during the same period.

### Status of Stock

The PBR level for this stock of 34 animals is calculated as the product of the minimum population estimate (3,431), one-half the default maximum net growth rate for cetaceans (2%), and a recovery factor of 0.5 (for a species of unknown status).

Harbor porpoise in California are not listed as threatened or endangered under the ESA nor as depleted under the MMPA. Calculation of the status of harbor porpoise relative to historic carrying capacity suggests that the central California population could have been reduced to between 30% and 97% of its carrying capacity size (K) by incidental fishing mortality. Present information is insufficient to narrow the range of this estimate, and the status of harbor porpoise relative to their OSP levels in central California is unknown. The average mortality rate of 31 animals over the past 3 years is slightly less than the calculated PBR (34 animals) for central California harbor porpoise; thus, the central California harbor porpoise population is not considered a strategic stock. The MMPA Pacific Scientific Review Group recommended, however, that this stock placed in strategic status because it is in decline and may be listed as threatened unless this trend is stopped. Because fishery mortality has been reduced over the past 10 years and because there is some indication that the decline in animals may be due to natural causes, NOAA Fisheries does not believe that a strategic status is justified at this time. Research will continue to monitor this population size and to investigate the possible causes of its decline.

## HUMPBAC WHALE: CALIFORNIA/MEXICO STOCK

### Stock Definition and Geographic Range

Four relatively separate migratory populations of Humpback whales have been identified in the north Pacific based on sightings of distinctively-marked individuals. These are the California/coastal Mexico stock, the Mexico offshore island stock (feeding destination unknown), the Hawaii/Alaska stock, and the

Japan stock (feeding destination probably the Aleutian Islands). The California/Mexico stock ranges from Costa Rica to Washington state but is most common in coastal waters of California (in summer/fall) and Mexico (in winter/spring).

Significant levels of genetic differences exist between the California and Alaska feeding groups based on analyses of mitochondrial DNA and nuclear DNA. The genetic exchange rate between California and Alaska is estimated to be less than 1 female per generation. Genetic profiles from animal samples in the Hawaiian and Mexican breeding areas showed fewer genetic differences than did the two feeding areas. These differences are substantiated by the observed movement of individually-identified whales between Hawaii and Mexico. There has been no individual matches between 607 humpbacks photographed in California and 567 humpbacks photographed in Alaska. Few whales photographed in British Columbia have matched with a California photographic catalog, indicating that British Columbia is an approximate geographic boundary between feeding populations.

### Population Size

Based on whaling statistics, the pre-1905 population of humpback whales in the North Pacific was estimated to be 15,000, but this population was reduced by commercial whaling to approximately 1,200 by 1966. The present North Pacific total certainly exceeds 3,000 humpback whales.

Population estimates for the "California feeding" stock ranges from 338 (CV=0.29) to 626 (CV=0.41). The most precise and least biased estimate is likely to be a 1994 mark-recapture estimate of 597 (CV=0.07) animals.

### Minimum Population Estimate

The minimum population estimate for humpback whales in the California/Mexico stock from mark-recapture methods is approximately 563 humpback whales.

### Current Population Trend

There is some indication that humpback whales have increased in abundance in California coastal waters between 1979/80 and 1991, but this trend is not significant. Mark-recapture population estimates have increased steadily



from 1988/90 to 1992/93 at about 5% per year. Although the North Pacific population is expected to have grown since it was given protected status in 1966, the possible effects of continued unauthorized take, incidental ship strikes, and gillnet mortality make this uncertain.

### Status of Stock

The PBR level is estimated as 1.1 whales; however, because this stock spends approximately half its time in Mexican waters, the PBR allocation for U.S. waters is one-half of the PBR estimate, or 0.5 whales per year.

Humpback whales in the North Pacific were estimated to have been reduced to 13% of carrying capacity (K) by commercial whaling, and the population remains severely depleted. The population's initial abundance has never been estimated separately for the "California" stock, but this stock was also probably depleted by whaling. Humpback whales are formally listed as endangered under the ESA, and consequently the California/Mexico stock is automatically considered as a depleted and strategic stock under the MMPA. Although the estimated annual mortality due to entanglement (0.5/yr) plus ship strikes (0.7/yr) in California is greater than the estimated PBR level allocation of 0.5 for this stock in U.S. waters, the California/ Mexico stock appears to be increasing in abundance.

### Eastern Tropical Pacific Dolphin

Approximately nine species of dolphins have been incidentally taken in the international fishery for yellowfin tuna in the tropical Pacific waters off Mexico and Central America (ETP area). Only four species (representing 10 stocks) have experienced significant mortality associated with the tuna fishery. Since these four species also occur in U.S. waters, and are impacted by U.S. fishing boats in the fleet, NOAA Fisheries has routinely assessed these dolphin populations.

The greatest mortality of dolphins occurred in the 1960s and 1970s, and led to dramatic declines in abundance of the northeastern spotted dolphin and eastern spinner dolphin stocks to one quarter of their pre-exploitation levels in 1959. Additionally, trend data collected since 1975 indicate both stocks are still signifi-

cantly below the levels of 1975. In 1993, NOAA Fisheries listed both the northeastern offshore spotted stock and the eastern spinner stock as depleted under the MMPA because they were below their OSPs.

Although the greatest mortality occurred in the 1960s and 1970s, recent incidental mortality of ETP dolphins was still fairly high. For example, in 1986, a total of 133,174 dolphins was estimated killed, and, out of eight stocks for which a PBR level can now be calculated, seven had incidental mortalities that exceeded their PBRs. As recently as 1991, mortality in the three stocks of greatest concern (northeastern spotted, eastern spinner, central common) still exceeded their PBRs. These PBR comparisons are illustrative only, as the MMPA specifically manages ETP dolphins by quotas, not calculated PBRs. Incidental mortality of northeastern spotted dolphins increased in 1986 to 7% of their abundance estimate, a level that is not likely to be sustainable, and this apparently led to another significant decline in the stock between 1985 and 1994. The data also indicate that the central stock of common dolphins is still significantly below its 1975 level.

Mortality of ETP dolphins has been declining since 1986, and has decreased dra-

**Table 23-2.**

### Eastern Tropical Pacific Dolphins

Stock	Abundance (CV)	N <sub>MIN</sub>	PBR <sup>2</sup>	Incidental Mortality in the Eastern Tropical Pacific Tuna Fishery		
Year(s)	1966-90	1986-90	1986-90	1992	1993	1994
Northeastern spotted <sup>1</sup>	730,000 (.142)	648,900	6,489	4,657	1139	934
West/South spotted	1,298,400 (.150)	1,145,100	11,451	1,874	757	1226
Coastal spotted	29,800 (.346)	22,500	225	N/A	N/A	N/A
Eastern spinner <sup>1</sup>	631,800 (.238)	518,500	5,185	2,794	821	743
Whitebelly spinner	101,9300 (.187)	872,000	8,720	2,044	412	619
Central American spinner	N/A	N/A	N/A	N/A	18	11
Northern common	476,300 (.367)	353,100	3,531	1,773	81	101
Central common	406,100 (.383)	297,400	2,974	1,815	230	151
Southern common	2,210,900 (.217)	1,845,600	18,456	64	0	0
Striped	1,918,000 (.112)	1,745,900	17,459	>112	17	11

<sup>1</sup> Listed as depleted under the Marine Mammal Protection Act.

<sup>2</sup> Comparison of recent incidental mortality to potential biological removal levels (PBRs) calculated for stocks of eastern tropical Pacific dolphins. It should be noted that ETP dolphins are explicitly excluded from management under the PBR section of the Marine Mammal Protection Act. Nonetheless, the calculated PBRs still provide a useful guide for interpreting the significance of dolphin mortality. Abundance estimates are from Wade and Gerrodette (1992). PBRs were calculated using an assumed maximum net productivity rate of 0.04 and a recovery factor of 0.5 in each case. Incidental mortality in boldface exceeds the PBR.

matically since 1991 (Table 23-2). A 1992 international agreement to manage the incidental mortality of ETP dolphins includes individual vessel quotas, that has led to a decrease in the total mortality of 3,796 dolphins of all species in 1994. Since 1992, the incidental mortality has been less than the estimated PBR for all stocks, and the annual incidental mortality of each stock is now less than 0.2% of their estimated abundance. Such low mortality rates should be sustainable and should, if continued, allow the northeastern spotted dolphin and the eastern spinner dolphin populations to increase and eventually recover.

There are still some uncertainties and concerns about the status of two small populations of endemic sub-species that are found in

the ETP, the coastal spotted dolphin and the central American spinner dolphin. An abundance estimate is only available for the coastal spotted stock, which indicates that mortality of more than 225 animals per year may not be sustainable. No coastal spotted dolphins were reported killed in 1993 and 1994 (with near 100% observer coverage), although they have been reported killed in previous years. Additionally, 41 and 237 unidentified dolphins were reported killed in 1993 and 1994, respectively, indicating some kills may have occurred. Only 18 and 11 central American spinner dolphins were reported killed in 1993 and 1994, respectively. Monitoring of both of these coastal distributed stocks remains important, particularly if much fishing effort occurs close to the coast. □